

CLAIMS

WHAT IS CLAIMED IS:

\ 1. Limiter optics for an ignition feedback regenerative free electron laser amplifier having a pulsed output beam of predetermined duration from an undulator comprising:

A. A pickoff means for directing a portion of the output of said pulsed output beam as a pickoff beam; and

B. a focusing assembler for bringing said directed pickoff beam to a focus at a selected point within said undulator at a selected time.

2. Limiter optics as described in Claim 1 where said pickoff means comprises a convex pickoff mirror for creating a pickoff beam which expands said pickoff beam to a predetermined size.

3. Limiter optics as described in Claim 1 where said focusing assembly further comprises:

A. An expander mirror for modifying spatial and temporal characteristics of said portion of the output picked off by said pickoff means;

B. a first focusing optics to focus said modified directed pickoff beam to a focal point;

C. a limiter plate movably placed near said focal point so as to have said focused modified directed pickoff beam pass through said limiter plate;

D. adjusting means operably connected to said limiter plate to move it closer to or farther from said focal point as desired; and

E. a second focusing optics placed after said pickoff beam has passed through said limiter plate to refocus said focused directed pickoff beam to a predetermined point in said ignition feedback regenerative free electron laser amplifier.

4. Limiter optics as described in Claim 2 where said focusing assembly further comprises:

A. An expander mirror for modifying spatial and temporal characteristics of said portion of the output picked off by said pickoff means;

B. a first focusing optics to focus said modified directed pickoff beam to a focal point;

C. a limiter plate movably placed near said focal point so as to have said focused modified directed pickoff beam pass through said limiter plate;

D. adjusting means operably connected to said limiter plate to move it closer to or farther from said focal point as desired; and

E. a second focusing optics placed after said pickoff beam has passed through said limiter plate to refocus said focused directed pickoff beam to a predetermined point in said ignition feedback regenerative free electron laser amplifier.

5. Limiter optics as described in Claim 3 where said expander mirror comprises a half silvered mirror which changes the pulse duration of the directed picked off portion of said pulsed output beam by a predetermined amount.

6. Limiter optics as described in Claim 4 where said expander mirror comprises a half silvered mirror which changes the pulse duration of the directed picked off portion of said pulsed output beam by a predetermined amount.

7. Limiter optics as described in Claim 3 where said expander mirror comprises a phased mirror having at least one step so as to increase the pulse duration of the directed picked off portion of said picked output beam.

8. Limiter optics as described in Claim 4 where said expander mirror comprises a phased mirror having at least one step so as to increase the pulse duration of the directed picked off portion of said picked output beam.

9. Limiter optics as described in Claim 3 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

10. Limiter optics as described in Claim 4 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

11. Limiter optics as described in Claim 5 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

12. Limiter optics as described in Claim 6 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

13. Limiter optics as described in Claim 7 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

14. Limiter optics as described in Claim 8 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

15. Limiter optics as described in Claim 3 where said expander mirror comprises a phased mirror of striped mesas, said striped mesa being parallel to each other and having a preselected height.

16. Limiter optics as described in Claim 4 where said expander mirror comprises a phased mirror of striped mesas, said striped mesa being parallel to each other and having a preselected height.

17. Limiter optics as described in Claim 15 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

18. Limiter optics as described in Claim 16 further comprising a Cassegrainian arrangement for said first focusing optics and a Cassegrainian arrangement for said second focusing optics.

19. A method of extending the duration of an optical pulse comprising the steps of:

A. Placing a phased pickoff mirror with a plurality of predetermined mesas in the path of said optical pulse for creating a plurality of parallel pulse beams from said optical pulse, each adjoining parallel pulse beam having a predetermined time lag from the other parallel beams;

B. transmitting said plurality of parallel pulse beams into an aperture of focusing optics such that all of said plurality of parallel pulse beams are focused to a predetermined location; and

C. refocusing optics optically arranged to refocus all light passing through said predetermined location to a second predetermined location such that said plurality of parallel pulsed beams are now appearing at the same desired location only separated in time.